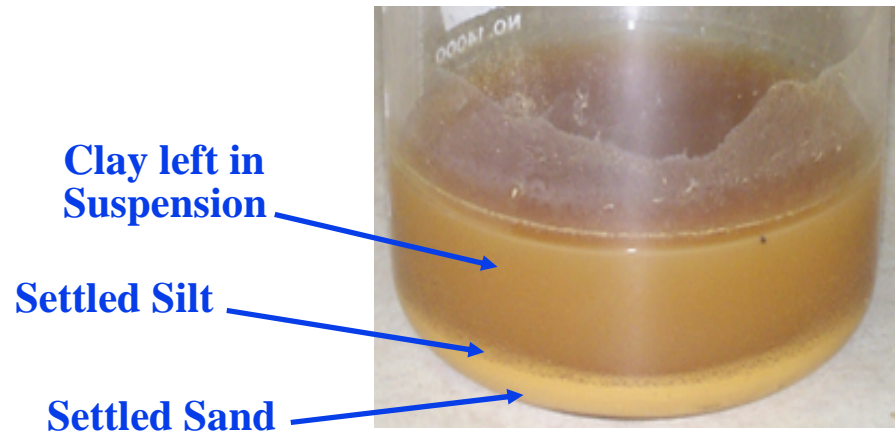


## Laboratory Analysis

### Particle-Size Distribution



Soil Mineral Particles Settled in Cylinder

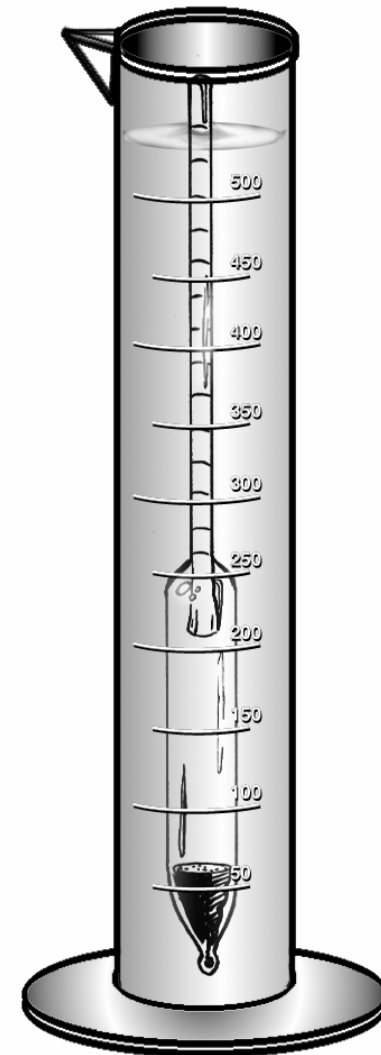
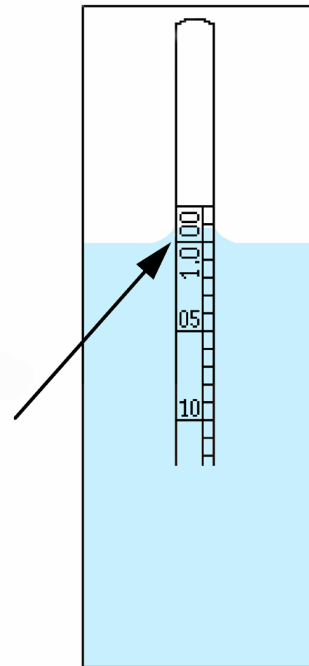
**Remember Stokes Law: The bigger they are, the faster they fall!**

## Laboratory Analysis

### Particle-Size Distribution (continued)

**Specific Gravity:** The weight of a substance relative to the weight of an equal volume of water.

This hydrometer reading is 1.000



## Laboratory Analysis

### Particle-Size Distribution (continued)

25g soil

100mL Dispersing Solution

50mL Distilled H<sub>2</sub>O

Put all three into a 500mL beaker and stir for one minute.

Cover with plastic wrap and let mixture sit for 24 hours.

Remove plastic wrap and stir for one minute.

Measure the distance from base of 500mL cylinder (0mL line) to 500mL line.

Pour entire soil mixture into 500mL cylinder.

Fill to 475mL line with distilled H<sub>2</sub>O and add to 500mL line with distilled H<sub>2</sub>O from squirt bottle.

Cover cylinder with plastic wrap.

# Laboratory Analysis

## Particle-Size Distribution (continued)

Shake Cylinder hand over hand 10 times.

Start timing. (e.g. timing starts at 10:05 am)

From when you start timing:

Time	Action	Sample Time
1 min. 30 sec.	Put Hydrometer in cylinder.	(10:06 30 secs.)
2 min.	Read hydrometer (remove, rinse and dry hydrometer).	(10:07)
2 min. 30 secs.	Put thermometer in cylinder.	(10:07 30 secs.)
3 min. 30 secs.	Take temperature reading (take out, clean and dry thermometer).	(10:08 30 secs.)
11 min. 30 sec.	Put Hydrometer in cylinder.	(10:16 30 secs.)
12 min.	Read hydrometer (remove, rinse and dry hydrometer).	(10:17)
12 min. 30 secs.	Put thermometer in cylinder.	(10:17 30 secs.)
13 min. 30 secs.	Take temperature reading (take out, clean and dry thermometer).	(10:18 30 secs.)

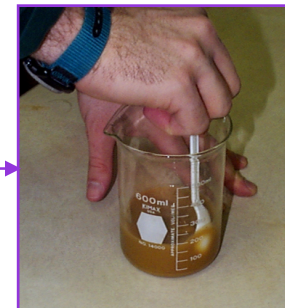
# Laboratory Analysis

## Particle-Size Distribution (continued)

1. Prepare the dispersing solution by mixing 50 g of Sodium Hexametaphosphate (or other soil dispersing agent) in 1 L of distilled water. Stir or shake until the dispersing agent has all dissolved.



2. Weigh 25 g of dried, sieved soil and pour it into a 250 mL or larger beaker. Add 100 mL of the dispersing solution and about 50 mL of distilled water to the beaker. Stir vigorously with a spoon or stirring rod for at least one minute. Be sure the soil is thoroughly mixed and does not stick to the bottom of the beaker. Do not let any of the soil suspension spill out the top.



# Laboratory Analysis

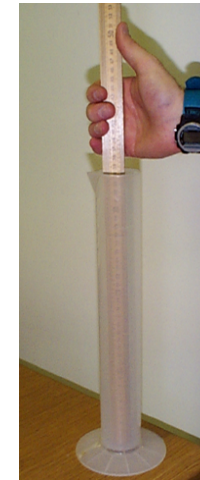
## Particle-Size Distribution (continued)

3. When the soil and dispersing solution are thoroughly mixed, set the beaker aside in a safe place and allow it to sit for roughly 24 hours (for this step, the soil/dispersing solution mixture can sit over the weekend until the next class).



4. Measure the distance between the 500 mL mark and the base of the cylinder. (You can place the measuring stick inside the cylinder to get this measurement.).

Record both the distance and the temperature on the Particle-Size Distribution Data Work Sheet.



5. Read the temperature at which your hydrometer has been calibrated (such as 15.6° C [60° F] or 20° C) which is found on the body of the hydrometer.

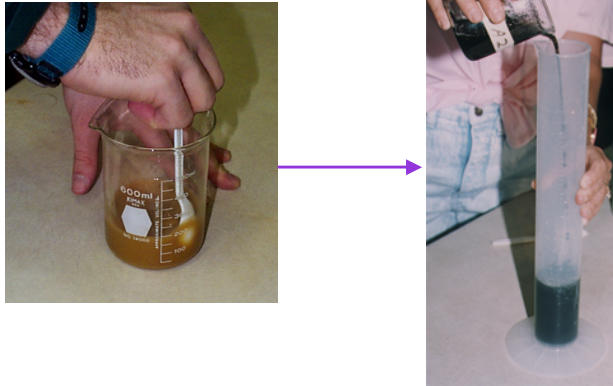
Temperature  
Calibration



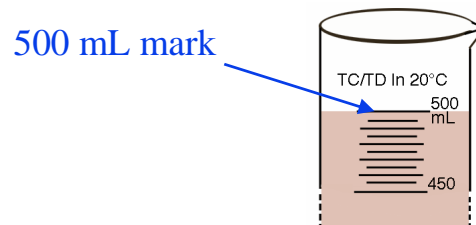
# Laboratory Analysis

## Particle-Size Distribution (continued)

6. At the next class, stir the suspension in the beaker again, and pour it into a 500 mL graduated cylinder. Use a squirt bottle to rinse out the beaker and add this to the soil mixture in the cylinder.



7. Add enough water to fill the cylinder to the 500 mL mark.



8. Securely cover the top of the cylinder using plastic wrap or other secure cover.

9. Mix vigorously by rotating the covered cylinder hand-over-hand at least 10 times. Be sure the soil is thoroughly mixed in the solution and does not stick to the bottom of the cylinder. Try not to let any of the suspension leak out the top.

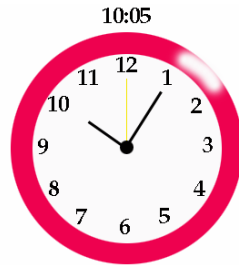




# Laboratory Analysis

## Particle-Size Distribution (continued)

10. Gently set the cylinder down in a safe place, and immediately begin timing with a stop watch or clock with a second hand.

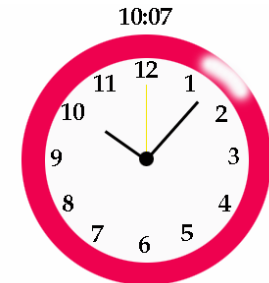


(Sample starting time)

11. After 1 minute, carefully lower the hydrometer into the cylinder so it floats in the suspension. Steady the hydrometer to keep it from bobbing up and down.



12. At exactly **2 minutes** after the cylinder was set down, read the line on the hydrometer that is closest to the surface of the soil suspension and record your result on the Particle-Size Distribution Data Work Sheet.

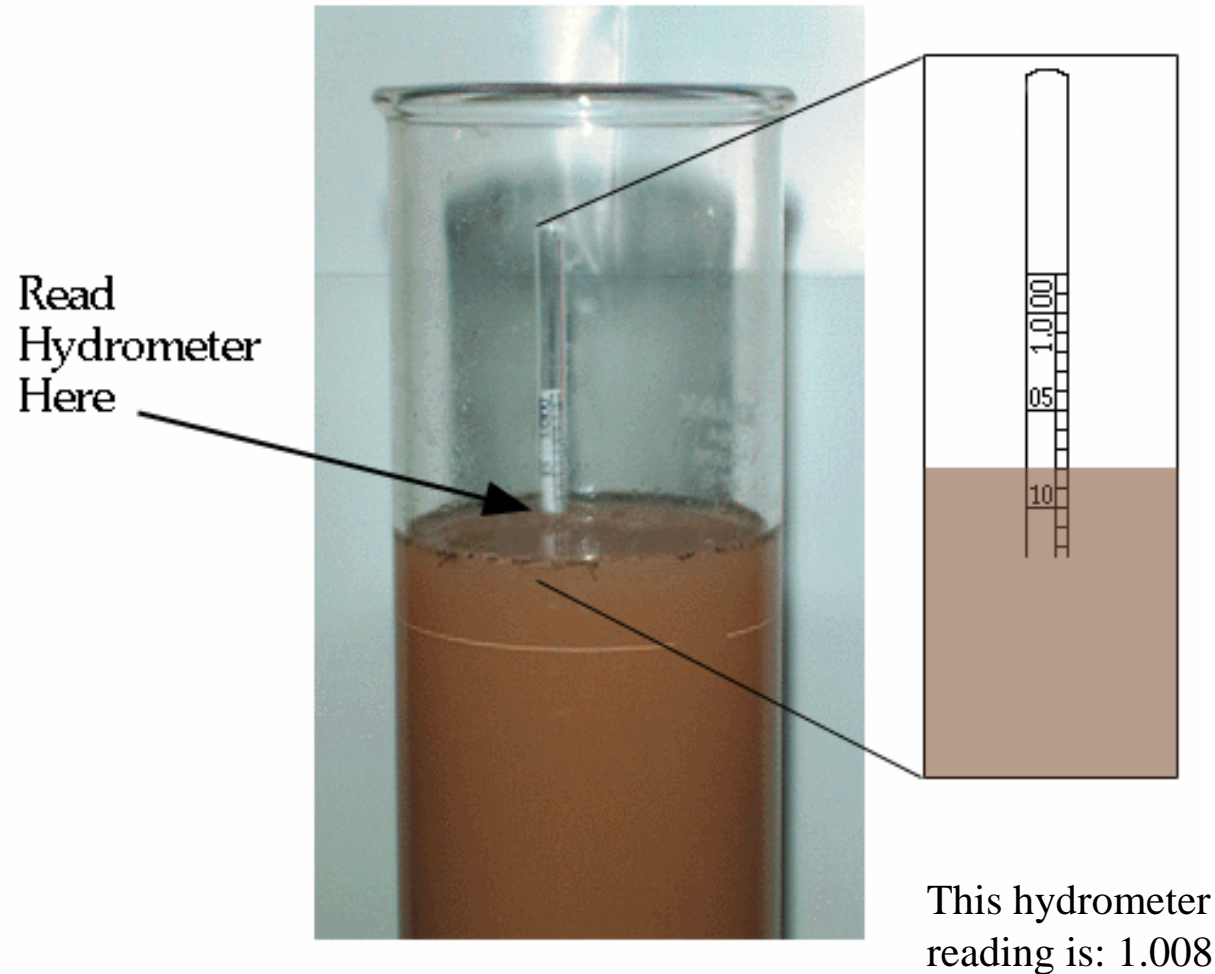


13. Remove the hydrometer, rinse it, dry it, and gently put it down in a safe place.



## Laboratory Analysis

### Particle-Size Distribution (continued)



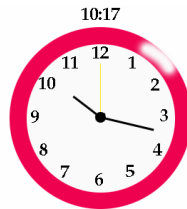
# Laboratory Analysis

## Particle-Size Distribution (continued)

14. Place the thermometer into the soil suspension for about 1 minute. At the end of 1 minute, remove the thermometer from the suspension, read the temperature, and record the result on the Particle-Size Distribution Data Work Sheet.



15. Take another hydrometer reading in the undisturbed cylinder at **12 minutes**. Place the hydrometer carefully in the suspension about 30 seconds before making the reading to allow it to settle.



16. Take and record another temperature reading for the suspension.
17. Rinse the hydrometer and thermometer off when they have been removed from the suspension and dry them.
18. Record these results on the Particle-Size Distribution Data Work Sheet.

# Laboratory Analysis

## Particle-Size Distribution (continued)

19. Leave the cylinder undisturbed for 24 hours (or until the beginning of the same class period the next day).

20. Take another hydrometer and temperature reading at **24 hours**. (**Note:** this time period is critical and **should not be longer than 24 hours**). Record the results on the Particle-Size Distribution Data Work Sheet.



21. Discard the soil suspension by pouring it into a special pail and spill the contents outside in a place for discarding soil materials. **Do not pour the suspension down the sink!**

22. Carefully rinse and dry the hydrometer, thermometer, beakers, and cylinders, and repeat the above steps two more times for the same horizon so that you have a total of three sets of results for each sample.

23. Repeat this procedure for each soil sample from every horizon.